

## **Quantitative Usage Analysis for Endosulfan**

Case Number: 0014

PC Code: 79401

Date: April 22, 1999

Analyst: Steven M. Nako

### **Endosulfan Use: Food Crops**

Based on available pesticide survey use data for the years 1987 through 1998, total average annual use of endosulfan is estimated at approximately 1.4 million pounds of active ingredient (lbs ai). Endosulfan is registered for use on numerous fruits, nuts and vegetable crops. Typical application rates for these food crops range from 0.5 lbs ai/acre to 1.0 lbs ai/acre, with 1-2 applications made per season. In terms of pounds applied, cotton, tomatoes, potatoes, apples are major use sites, with approximately 286,000 lbs ai, 194,000 lbs ai, 120,000 lbs ai and 110,000 lbs ai applied annually to these crops, respectively.

The accompanying table also presents 'likely average' and 'likely maximum' Percent of Crop Treated (%CT) projections, by crop. A relatively large percent of various cucurbits are treated with endosulfan (e.g., 41% of cantaloupes, 40% of squash, and 29% of honeydew melons), as are tomatoes (20%), pears (20%), and strawberries (14%). As is often the case for many insecticide uses, the actual %CT may (depending upon the crop) fluctuate considerably from year to year due to varying pest pressures (e.g., weather related infestations), and economic factors. The likely maximum %CT projections are designed to account for these factors, as well as for uncertainty within and across the various survey estimates.

### **Endosulfan Use: Non-food Crops/Sites**

Endosulfan is also applied to various ornamental plants and shrubs in horticultural nurseries, and ornamentals. As much as 80,000 lbs ai of endosulfan are believed to be applied by horticultural nurseries in greenhouses; mainly to control for aphids, whiteflies and thrips (USDA, NAPIAP Report, 1-CA-96). Residential use of endosulfan is believed to be negligible. According to the 1993 Certified/Commercial Pesticide Applicator Survey, an estimated 75 lbs ai of endosulfan were also applied to residential sites by for-hire applicators.

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EPA's QUANTITATIVE USAGE ANALYSIS

Site	Acres Grown (000)	Acres Treated (000)		% of Crop Treated		LBS AI Applied (000)		Average Application Rate			States of Most Usage
		Wtd Avg	Est Max	Wtd Avg	Est Max	Wtd Avg	Est Max	lb ai/ acre/yr	#appl / yr	lb ai/ A/appl	(% of total lb ai used on this site)
Blueberries	59	1	3	2%	6%	1	3	0.8	1.5	0.5	NC GA NJ 100%
Strawberries	51	7	11	14%	21%	9	14	1.3	1.4	0.9	OR MI CA WI NY 76%
Grapes	825	24	47	3%	6%	34	102	1.4	1.4	1.0	CA OR 82%
Grapefruit	194	2	10	1%	5%	3	14	1.5	2.0	0.7	FL 100%
Oranges	867	3	10	0%	1%	4	14	1.3	1.7	0.8	FL 86%
Pineapple (flowering)	12	2	4	18%	35%	6	12	3.0	2.0	1.5	HI 100%
Citrus, Other	51	0	0	0%	<1%	0	1	12.0	3.0	4.0	FL 100%
Apples	572	72	114	13%	20%	110	215	1.5	1.4	1.1	WA NY MI MN ID NC 71%
Pears	78	15	31	20%	40%	35	72	2.3	1.2	1.8	WA OR CA 83%
Apricots/Nectarines	57	1	2	2%	4%	2	3	1.7	2.0	0.8	FL NJ WA CO PA AL 82%
Cherries, Total	95	2	6	3%	7%	5	12	2.1	1.2	1.8	UT MI WA CA NY 82%
Cherries, Sweet	47	2	4	5%	8%	5	9	2.2	1.2	1.8	WA MI 90%
Cherries, Tart	48	0	2	1%	5%	0	3	1.4	1.0	1.3	MI 100%
Peaches	212	16	35	7%	17%	29	91	1.8	2.6	0.7	GA MI NJ AR FL MS 63%
Plums & Prunes	164	5	12	3%	7%	8	21	1.8	1.0	1.8	WA OR CA
Plums	64	3	8	4%	12%	5	14	1.8	1.0	1.8	WA OR CA 86%
Prunes	100	2	4	2%	4%	4	7	1.8	1.0	1.8	WA OR CA 86%

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		Wtd Avg	Est Max	Wtd Avg	Est Max	Wtd Avg	Est Max	lb ai/ acre/yr	#appl / yr	lb ai/ A/appl	(% of total lb ai used on this site)
Almonds	429	0	0	0%	<1%	0	1	2.4	1.0	2.4	CA 100%
Hazelnuts (Filberts)	27	2	5	7%	18%	2	5	1.0	1.0	1.0	OR WA 100%
Macadamia Nuts	20	2	6	10%	30%	-	-	-	-	-	HI 100%
Pecans	488	51	88	11%	18%	59	138	1.2	1.9	0.6	GA OK MS 81%
Walnuts	205	1	2	0%	1%	1	3	1.4	1.6	0.9	CA 95%
Eggplant	4	2	3	41%	83%	3	6	1.9	3.6	0.5	FL NJ 89%
Peppers, Total	78	10	13	12%	17%	14	32	1.5	2.5	0.6	FL TX CA NC
Peppers, Bell	55	9	10	16%	19%	14	30	1.6	2.6	0.6	FL TX CA NC
Peppers, Hot	23	1	3	4%	12%	1	2	0.8	1.0	0.8	CA 100%
Tomatoes, Total	465	93	198	20%	43%	194	398	2.0	3.9	0.5	FL MI NJ NC GA
Tomatoes, Fresh	136	64	127	47%	94%	170	339	2.7	5.0	0.5	FL MI NJ NC GA 95%
Tomatoes, Proc.	329	29	71	9%	22%	24	58	0.8	1.7	0.5	MI NJ 100%
Broccoli	114	15	30	13%	26%	16	32	1.1	1.3	0.8	AZ CA 85%
Brussels Sprouts	3	0	0	2%	10%	0	0	0.8	1.0	0.8	CA 100%
Cabbage, Total	92	16	24	18%	26%	22	48	1.4	2.1	0.7	FL TX NY
Cabbage, Fresh	86	16	23	19%	28%	22	47	1.4	2.1	0.7	FL TX 93%
Cabbage, Proc.	6	0	1	7%	18%	0	1	0.9	1.7	0.5	NY 100%
Cauliflower	58	9	19	16%	32%	7	15	0.8	1.2	0.7	CA AZ FL 86%

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		Wtd Avg	Est Max	Wtd Avg	Est Max	Wtd Avg	Est Max	lb ai/ acre/yr	#appl / yr	lb ai/ A/appl	(% of total lb ai used on this site)
Potatoes	1,421	144	234	10%	16%	120	187	0.8	1.3	0.6	ND WI ME CO MI ID 51%
Sweet Corn	784	2	5	0%	1%	4	7	1.4	2.0	0.7	CA FL MI NC 90%
Beans, Dry	1,802	2	57	0%	3%	5	163	2.9	4.6	0.6	CA 98%
Beans, Lima	35	0	2	0%	5%	-	-	-	-	-	GA 100%
Beans, Snap Total	200	11	26	6%	13%	17	39	1.5	2.5	0.6	FL GA CA WA NC
Beans, Snap Fresh	65	10	20	15%	30%	15	29	1.5	2.5	0.6	FL GA CA 84%
Beans, Snap Processed	135	1	7	1%	5%	2	10	1.5	2.5	0.6	FL GA WA NC 82%
Peas, Dry	249	0	11	0%	4%	0	10	0.9	1.0	0.9	TX 80%
Peas, Green	386	1	16	0%	4%	1	42	2.5	1.0	2.5	NJ FL 90%
Alfalfa	23,949	15	47	0%	<1%	10	30	0.7	1.5	0.5	CA OK WA UT AZ 91%
Barley	7,505	0	2	0%	<1%	0	1	0.3	1.0	0.3	CO 100%
Oats\Rye	6,133	0	1	0%	<1%	0	0	0.6	1.0	0.6	AR ME 100%
Wheat, Winter	45,854	41	79	0%	<1%	20	43	0.5	1.3	0.4	OK KS TX TN 83%
Soybeans	62,879	42	103	0%	<1%	13	31	0.3	1.0	0.3	OH LA IA 83%
Sunflower	2,745	17	88	1%	3%	2	9	0.1	1.0	0.1	MN SD TX 92%
Safflower	235	0	20	0%	9%	-	-	-	-	-	
Canola\Rapeseed	1,200	0	20	0%	2%	-	-	-	-	-	
Sugar Beets	1,415	2	4	0%	<1%	3	6	1.5	1.3	1.2	OH CA 88%
Sugarcane	926	0	0	0%	<1%	-	-	-	-	-	
Tobacco	695	54	84	8%	12%	63	97	1.2	1.4	0.9	KY GA NC TN 82%

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Cotton	13,000	286	520	2%	4%	286	520	1.0	2.5	0.4	MS LA TX AZ 84%
Subtotal Agric. Use		1,200	1,800			1,400	2,200				
Non-Agricultural Sites:											
Horticultural Nurseries						50	80				
Residential: Outdoors						0	1				
Subtotal Non-Agric. Use						50	81				
Total Use (1,000 Lbs AI)						1,450	2,281				

FOOTNOTES TO ACCOMPANY ENDOSULFAN QUA TABLES, Steven M. Nako, April 22, 1999.

#### COLUMN HEADINGS

Weighted average - computed with the most recent years and more reliable data are weighted more heavily.

Est Max = Estimated maximum, which is estimated from available data.

Average application rates are calculated from the weighted averages.

#### NOTES ON TABLE DATA

Usage data primarily covers 1987 - 1998.

Calculations of the above numbers may not appear to agree because they are displayed as rounded:

to the nearest 1000 for acres treated or lb. a.i. (Therefore 0 = < 500)

to the nearest whole percentage point for % of crop treated. (Therefore 0% = < 0.5%)

0\* = Available EPA sources indicate that no usage is observed in the reported data for this site (%CT=0).

A dash (-) indicates that information on this site is NOT available in EPA sources or is insufficient to generate %CT estimates.

#### OTHER CROP GROUPS

Citrus, Other includes kumquats, limes, tangelos, and tangerines.

NO DATA for Mustard Greens, Kale, Kohlrabi, Watercress and Turnips.

#### DATA SOURCES

Agricultural (Crop) Sites: USDA Agricultural Chemical Usage Reports, NCFAP, and various proprietary data sources, including Doane, Maritz, Mike Buckley. Pineapple estimates from Calvin Oda, Pineapple Growers Assoc. of Hawaii, 4/21/99, memo to Nako; Macadamia nut estimates from Alan Yamaguchi, Hawaii Macadamia Nut Assoc., 4/21/99, personal communications with Nako.

Non-Agric. (Non-Food Crop) Sites: USDA, Biological and Economic Assessment of Chlorpyrifos and Diazinon in Ornamentals and Sod Production, 11/94; USDA, Biological and Economic Assessment of Pest Management in the United States Greenhouse and Nursery Industry, NAPIAP Report, 1-CA-96; 1993 Certified/Commercial Pesticide Applicator Survey; Kline; SRI.